

**PCT**WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau

## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup> :</b> <b>A61F 13/15</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 97/39711</b> <b>(43) International Publication Date:</b> 30 October 1997 (30.10.97)
<b>(21) International Application Number:</b> PCT/US97/06479 <b>(22) International Filing Date:</b> 11 April 1997 (11.04.97) <b>(30) Priority Data:</b> 96106418.5 24 April 1996 (24.04.96) EP <b>(34) Countries for which the regional or international application was filed:</b> DE et al. <b>(71) Applicant (for all designated States except US):</b> THE PROCTER & GAMBLE COMPANY [US/US]; One Procter & Gamble Plaza, Cincinnati, OH 45202 (US). <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> BONELLI, Guido [IT/IT]; Via Colle Innamorati, 99, I-65125 Pescara (IT). <b>(74) Agents:</b> REED, T., David et al.; The Procter & Gamble Company, 5299 Spring Grove Avenue, Cincinnati, OH 45217 (US).		<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> ADAPTABLE SANITARY NAPKIN  <b>(57) Abstract</b>  The present invention relates to absorbent articles, particularly sanitary napkins or panty liners, made for joining to the undergarment of a wearer. Such articles are typically joined to the undergarment of a wearer while the wearer has the undergarment lowered down and stretched between the legs. Underpants are available in different sizes according to the dimension of the wearer of such articles. Hence the same wearer will apply identical absorbent articles to undergarments of differing dimensions and may attempt to apply the article without regard to such difference. According to the present invention the absorbent articles are rendered adaptable at least in one direction to reduce wrinkling or folding of the absorbent article upon application to the undergarment and provide more consistently fitting articles despite the variation in undergarment dimensions.		

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon	KR	Republic of Korea	PL	Poland		
CN	China	KZ	Kazakhstan	PT	Portugal		
CU	Cuba	LC	Saint Lucia	RO	Romania		
CZ	Czech Republic	LI	Liechtenstein	RU	Russian Federation		
DE	Germany	LK	Sri Lanka	SD	Sudan		
DK	Denmark	LR	Liberia	SE	Sweden		
EE	Estonia			SG	Singapore		

## **ADAPTABLE SANITARY NAPKIN**

### **Field of the Invention**

The present invention relates to absorbent articles, particularly sanitary napkins or panty liners, made for joining to the undergarment of a wearer. Such articles are typically joined to the undergarment of a wearer while the wearer has the undergarment lowered down and stretched between the legs. The undergarment is typically a pair of elastic, cloth or cloth-like underpants. Underpants are available in different sizes according to the dimension of the wearer of such articles. However due to differences in fashion, differences in cloth material, differences in desired comfort as well as the need to adapt the undergarment of a single size to the physical variation of their user group the undergarment dimensions of an individual wearer can vary substantially. Hence the same wearer will apply identical absorbent articles to undergarments of differing dimensions and may attempt to apply the article with out regard to such difference. According to the present invention the absorbent articles are rendered adaptable at least in one direction to reduce wrinkling or folding of the absorbent article upon application to the undergarment and provide more consistently fitting articles despite the variation in undergarment dimensions.

### **Background of the invention**

It is known that absorbent articles which are worn in the undergarment of a wearer can be drastically improved if their positioning, structural integrity, and special adaptation to the particular wearing condition can be ensured at all times during use of such products. In this respect many developments have attempted to provide extensible, elastically extensible, highly flexible, or, more generally, deformable absorbent articles which would help in providing the product with the ability to follow movements during use of a wearer.

It has therefore been thought in the prior art to utilize the above mentioned elements in ensuring proper fit of a disposable absorbent article, such as a sanitary napkin or panty liner, to create a product which is comfortable and well

performing during use. Hence products which are adapted to follow movements during use have been developed over time. However, absorbent articles are typically not provided directly into the in-use wearing position, but are attached to the undergarment of a wearer before the undergarment is pulled into its final wearing position. Typically the undergarment is put into a special mounting or application position, to apply the absorbent article which is not at all similar to that in which the undergarment will be, once the undergarment has been pulled up into the wearing position.

Typically sanitary napkins or panty liners are attached to an undergarment while that undergarment is in a pulled down position between the legs of a wearer. Usual undergarments are able to stretch and retract, i.e. elastically stretch in order to provide good comfort and proper fit while putting the undergarment on and during use of such an undergarment. Hence the undergarment in the pulled down position can be in an extended configuration when the disposable absorbent article is applied to the undergarment. This can have several effects including that the article crumples or delaminates which will cause an unacceptable fit already at the beginning of the usage period.

Another problem of disposable absorbent articles which are attached to the undergarment is due to the fact that one and the same wearer typically uses the same absorbent article with different pieces of undergarments. However, different pieces of undergarments even though used by the same wearer have a variety of shape and size differentials, typically due to fashion, materials, the number of sizes of the particular undergarment kinds produced by undergarment suppliers, and their respective production variations. Hence the same wearer tends to apply the same absorbent article to undergarments having drastically different dimensions in particular different crotch widths (i.e. the closest distance between the right and the left leg opening of an underpants). The wearer will do this usually with the expectation to achieve the same result each time without regard to the differences induced by the individual wearer.

It has been considered that a single wearer will typically attempt to achieve an identically application appearance of the disposable absorbent article

irrespective of the variations in his/her undergarments. Hence for undergarments having for example a wide crotch width, the respective absorbent article may be stretched further than would be the case for an undergarment having a narrow crotch width. This problem obviously can be addressed by rendering the absorbent articles extensible. However, extendibility, particularly elastic (i.e. retractive) extendibility, will cause the product to be under a certain, but each time different, stress condition when finally ending up in the in-use position of the article.

Therefore the products will perform in their main characteristics, i.e. absorbency, leakage, or comfort and fit, differently depending on the size differentials found in the undergarments of a particular wearer of such articles. This problem of performance variation in dependence of garment size variation of the individual wearer may cause the disposable absorbent article to be unacceptable for the respective wearer. It is hence desirable that the absorbent article behave consistently, or at least as close to consistently as possible, across the variations commonly found between the different shapes and sizes of undergarments which can be found on an individual wearer of such articles.

It is hence an objective of the present invention to provide disposable absorbent articles, particularly sanitary napkins or panty liners which can provide good fit after undergoing the individual application procedure. It is a particular objective of the present invention to provide absorbent articles with a sustainable ability to follow the movements and stresses of the undergarment in order to maintain a wearer proximity approaching that of the undergarment itself. It is a particular objective of the present invention to provide absorbent articles which are able to adapt upon initial application to the size differences found between different undergarments.

#### Brief description of the invention

The present invention relates to an absorbent article which is joined in use to the undergarment of a wearer. The article has a longitudinal axis and a transverse or cross directional axis and comprises three main elements, namely a topsheet for liquid passage, a backsheet forming the outer surface which is

facing the undergarment during use, and an absorbent core interposed between the topsheet and the backsheet. The absorbent article also has a panty fastening means which is provided on the outer surface of the backsheet in order to join the article to the undergarment of the wearer. The article according to the present invention is adaptable in size at least in a direction parallel to the longitudinal axis, or parallel to the transverse axis, or a combination thereof. Since the adoption to the undergarment is particularly important in a direction substantially parallel to the transverse axis of the disposable absorbent article, they are preferred embodiments of the present invention.

Particularly preferred disposable absorbent articles are sanitary napkins or panty liners having a maximum thickness of less than 5 mm, preferably less than 2 mm thickness. In one embodiment according to the present invention the whole absorbent article comprising topsheet, backsheet, and absorbent core, is corrugated or pleated with the corrugation or pleats being parallel to the longitudinal axis of the absorbent article.

An absorbent article according to the present invention can comprise a release liner protecting the panty fastening means prior to use of the article. It is particularly preferred if this release liner is substantially non-extensible and non-contractible such that placing it on a corrugated or pleated absorbent article protects the corrugations or pleats during manufacturing, packaging, and transport of the absorbent article until it is put to use by delaminating the release liner prior to mounting the absorbent article into an undergarment.

It is also possible that one, several, or all the main elements of the absorbent article (topsheet, backsheet, and absorbent core) are elastically extensible beyond the limits of adaptability while at least the non-elastically extensible element(s) is/are provided with corrugation or pleats substantially parallel to the longitudinal axis of the product. This will provide the disposable absorbent article with the desired adaptability while also providing elasticity to the article. Hence it is a particularly preferred embodiment of the present invention when all the main elements of the article, mainly the topsheet, the absorbent core, and the backsheet, are individually and in their combination elastically extensible while the whole of the absorbent article is corrugated or pleated with the

corrugation or pleats substantially parallel to the longitudinal axis of the absorbent article.

In a particularly preferred embodiment according to the present invention, the panty fastening means is provided by pressure sensitive adhesives which is preferably provided only to the corrugated or pleated outward facing surface of the backsheet, if the absorbent article was corrugated or pleated as a means to render it adaptable.

#### Detailed description of the invention

The present invention will be described by reference to sanitary napkins or pantyliners. It is however equally well applicable to sanitary napkins or adult incontinence products which are worn in an undergarment and are joint to the undergarment during wearing of the absorbent product.

Absorbent products according to the present invention comprise typically three main components: a liquid pervious topsheet, a liquid impervious backsheet and an absorbent core. The absorbent core is enclosed by the backsheet and the topsheet and the product is worn such that the exposed surface of the topsheet faces the wearer of the absorbent product while the exposed surface of the backsheet faces the undergarment to which the product is joint by a panty-fastening attachment means. Typically this is an adhesive but could also be a mechanical attachment.

The present invention is concerned with the adaptability of the product. The degree of adaptability is determined by the selection of the materials for the components of the product as mentioned above, their respective quantity and to which extend they have been treated to provide adaptability. It will be apparent to those skilled in the art that, in order to achieve the adaptability according to the present invention, the selection of kind, quantity and treatment of raw materials has to be balanced with other desired characteristics of the absorbent product such as for example absorbent capacity, absorption speed and surface dryness on the outside of the topsheet during use, and so on.

Therefore the following description of typical materials of the main components of the absorbent product will allow to provide a large number of product variants which satisfy the requirements according to the present invention.

In addition to adaptability the absorbent articles according to a preferred embodiment of the present invention are elastically stretchable. The term 'elastically stretchable', as used herein, means that when the stretching forces are removed, the article will tend to return toward its unextended or unstretched (or 'original' dimensions). It need not return all the way to its unstretched dimensions, however. If the absorbent article is elastically stretchable it may be stretchable in one or two directions (which are not-parallel) within the plane of the product i.e. parallel to the garment facing surface.

Materials for contractible and elastically stretchable articles can be elastically stretchable per se or be treated so as to provide elastic stretchability. In particular elastic backsheet material, elastic topsheet material, filamentary materials combined with elastic strands, threads or webs as well as shirring, pleating or ring rolling of the materials may be employed in this context. Suitable material and methods are known in the art and e.g. disclosed in detail in US application 08/192240 of February 4, 1994 specifically referred to in order to facilitate selection of materials if elastically stretchable absorbent articles according to the present invention are made.

In the following, non-limiting embodiments of the main elements of the absorbent product are described which can be employed in contractible and preferably also elastically stretchable or non-stretchable designs.

#### Absorbent core

The absorbent core typically includes the following components: (a) optionally a primary fluid distribution layer; (b) optionally, but preferably, a secondary fluid distribution layer; (c) a fluid storage layer; (d) optionally a fibrous ("dusting") layer underlying the storage layer; and (e) other optional components.

##### a. Primary Fluid Distribution Layer



One optional component of the absorbent cores according to the present invention is the primary fluid distribution layer. This primary distribution layer typically underlies the topsheet and is in fluid communication therewith. The topsheet transfers the acquired menstrual fluid to this primary distribution layer for ultimate distribution to the storage layer. This transfer of fluid through the primary distribution layer occurs not only in the thickness, but also along the length and width directions of the absorbent product.

b. Optional Secondary Fluid Distribution Layer

Also optional but a preferred component of the absorbent cores according to the present invention is a secondary fluid distribution layer. This secondary distribution layer typically underlies the primary distribution layer and is in fluid communication therewith. The purpose of this secondary distribution layer is to readily acquire fluid from the primary distribution layer and transfer it rapidly to the underlying storage layer. This helps the fluid capacity of the underlying storage layer to be fully utilized.

c. Fluid Storage Layer

Positioned in fluid communication with, and typically underlying the primary or secondary distribution layers, is a fluid storage layer comprising certain absorbent gelling materials and/or other absorbent materials, which can form the carrier matrix for the absorbent gelling materials. Absorbent gelling materials are usually referred to as "hydrogels," "superabsorbent" "hydrocolloid" materials. Absorbent gelling materials are those materials that, upon contact with aqueous fluids, especially aqueous body fluids, imbibes such fluids and thus form hydrogels. These absorbent gelling materials are typically capable of absorbing large quantities of aqueous body fluids, and are further capable of retaining such absorbed fluids under moderate pressures. These absorbent gelling materials are typically in the form of discrete, nonfibrous particles.

The fluid storage layer can comprise solely absorbent gelling materials, or these absorbent gelling materials can be dispersed homogeneously or non-homogeneously in a suitable carrier or it can comprise solely an absorbent carrier material.

Suitable carriers include cellulose fibers, in the form of fluff, tissues or paper such as is conventionally utilized in absorbent cores. Modified cellulose fibers such as the stiffened cellulose fibers can also be used. Synthetic fibers can also be used and include those made of cellulose acetate, polyvinyl fluoride, polyvinylidene chloride, acrylics (such as Orlon), polyvinyl acetate, non-soluble polyvinyl alcohol, polyethylene, polypropylene, polyamides (such as nylon), polyesters, bicomponent fibers, tricomponent fibers, mixtures thereof and the like. Preferred synthetic fibers have a denier of from about 3 denier per filament to about 25 denier per filament, more preferably from about 5 denier per filament to about 16 denier per filament. Also preferably, the fiber surfaces are hydrophilic or are treated to be hydrophilic. The storage layer can also include filler materials, such as Perlite, diatomaceous earth, Vermiculite, etc., that lower rewet problems.

If dispersed non-homogeneously in a carrier, the storage layer can be locally homogeneous, i.e. have a distribution gradient in one or several directions within the dimensions of the storage layer. Non-homogeneous distribution can also refer to laminates of carriers enclosing absorbent gelling materials partially or fully. If laminates are used they can be formed with or without absorbent gelling particles. In particular thermally bonded air laid fibrous sheets or laminates and/or thermally bonded wet laid sheets or laminates have been found useful, especially in the context of panty liners when no absorbent gelling material is used.

Preferably, the storage layer comprises from about 15 to 100% absorbent gelling materials and from 0 to about 85% carrier. More preferably, the storage layer comprises from about 30 to 100 %, most preferably from about 60 to 100% absorbent gelling materials and from 0 to about 70 %, most preferably from 0 to about 40 %, carrier.

Suitable absorbent gelling materials for use herein will most often comprise a substantially water-insoluble, slightly crosslinked, partially neutralized, polymeric gelling material. This material forms a hydrogel upon contact with water. Such polymer materials can be prepared from polymerizable, unsaturated, acid-containing monomers. Suitable unsaturated acidic monomers for use in preparing the polymeric absorbent gelling material used in this invention include those listed in U.S. Patent 4,654,039 and reissued as RE 32,649. Preferred monomers include acrylic acid, methacrylic acid, and 2-acrylamido-2-methyl propane sulfonic acid. Acrylic acid itself is especially preferred for preparation of the polymeric gelling material. The polymeric component formed from the unsaturated, acid-containing monomers can be grafted onto other types of polymer moieties such as starch or cellulose. Polyacrylate grafted starch materials of this type are especially preferred. Preferred polymeric absorbent gelling materials that can be prepared from conventional types of monomers include hydrolyzed acrylonitrile grafted starch, polyacrylate grafted starch, polyacrylates, maleic anhydride-based copolymers and combinations thereof. Especially preferred are the polyacrylates and polyacrylate grafted starch.

While these absorbent gelling materials are typically in particle form, it is also contemplated that the absorbent gelling material can be in the form of macrostructures such as fibers, sheets or strips.

d. Optional Fibrous ("Dusting") Layer

An optional component for inclusion in the absorbent cores according to the present invention is a fibrous layer adjacent to, and typically underlying the storage layer. This underlying fibrous layer is typically referred to as a "dusting" layer since it provides a substrate on which to deposit absorbent gelling material in the storage layer during manufacture of the absorbent core. Indeed, in those instances where the absorbent gelling material is in the form of laminates or of macrostructures such as fibers, sheets or strips, this fibrous "dusting" layer need not be included. However, because this "dusting" layer provides some additional fluid-handling capabilities such as rapid wicking of fluid along the length of the pad, its inclusion is typically preferred in absorbent cores according to the present invention.

e. Other Optional Components

The absorbent cores according to the present invention can include other optional components normally present in absorbent webs. For example, a reinforcing scrim can be positioned within the respective layers, or between the respective layers, of the absorbent cores. Such reinforcing scrims should be of such configuration as to not form interfacial barriers to fluid transfer, especially if positioned between the respective layers of the absorbent core. Given the structural integrity that usually occurs as a result of thermal bonding, reinforcing scrims are usually not required for the absorbent structures according to the present invention. If used however they have to allow the desired contractability.

Another component which can be included in the absorbent core according to the invention and preferably is provided close to or as part of the primary or secondary fluid distribution layer are odor control agents. These can be selected from active carbon or coated active carbon to concede the color, suitable zeolite or clay materials, are optionally incorporated in the absorbent core also absorbent gelling material in combination with certain zeolites have been found useful. These components can be incorporated in any desired form but often are included as discrete, non-fibrous particles.

Topsheet

The topsheet is compliant, soft feeling, and non-irritating to the wearer's skin. As indicated above the topsheet material also can be elastically stretchable in one or two directions. Further, the topsheet is inherently fluid pervious permitting fluids (e.g., menses and/or urine) to readily penetrate through its thickness. A suitable topsheet can be manufactured from a wide range of materials such as woven and nonwoven materials; polymeric materials such as apertured formed thermoplastic films, apertured plastic films, and hydroformed thermoplastic films; porous foams; reticulated foams; reticulated thermoplastic films; and thermoplastic scrims. Suitable woven and nonwoven materials can be comprised of natural fibers (e.g., wood or cotton fibers), synthetic fibers (e.g.,

polymeric fibers such as polyester, polypropylene, or polyethylene fibers) or from a combination of natural and synthetic fibers.

Preferred topsheets for use in the present are selected from high loft nonwoven topsheets and apertured formed film topsheets. Apertured formed films are especially preferred for the topsheet because they are pervious to body exudates and yet non-absorbent and have a reduced tendency to allow fluids to pass back through and rewet the wearer's skin. Thus, the surface of the formed film that is in contact with the body remains dry, thereby reducing body soiling and creating a more comfortable feel for the wearer. Suitable formed films are described in U.S. Patent 3,929,135; U.S. Patent 4,324,246; U.S. Patent 4,342,314; U.S. Patent 4,463,045; and U.S. 5,006,394. Particularly preferred microapertured formed film topsheets are disclosed in U.S. patent 4,609,518 and U.S. patent 4,629,643. The preferred topsheet for the present invention is the formed film described in one or more of the above patents and marketed on sanitary napkins by The Procter & Gamble Company of Cincinnati, Ohio as "DRI-WEAVE."

Topsheets having not a homogeneous distribution of liquid passage ways but only a portion of the topsheet comprising liquid passage ways are also contemplated by the present invention. Typically such topsheets would have the liquid passage ways oriented such that they result in a centrally permeable and peripherally impermeable topsheet for liquids.

The body surface of the formed film topsheet can be hydrophilic so as to help liquid to transfer through the topsheet faster than if the body surface was not hydrophilic. In a preferred embodiment, surfactant is incorporated into the polymeric materials of the formed film topsheet such as is described in U.S. Patent Application Serial No. 07/794,745, filed on November 19, 1991. Alternatively, the body surface of the topsheet can be made hydrophilic by treating it with a surfactant such as is described in the above referenced U.S. 4,950,254.

#### Backsheet

The backsheet prevents the exudates absorbed and contained in the absorbent core from wetting articles that contact the sanitary napkin in particular undergarments. The backsheet is preferably impervious to liquids (e.g., menses and/or urine) and is preferably manufactured from a thin plastic film, although other flexible liquid impervious materials can also be used. The backsheet needs to be compliant and will readily conform to the general shape and contours of the human body. The backsheet preferably also can have characteristics allowing it to elastically stretch in one or two directions.

The backsheet can comprise a woven or nonwoven material, polymeric films such as thermoplastic films of polyethylene or polypropylene, or composite materials such as a film-coated nonwoven material. Preferably, the backsheet is a polyethylene film having a thickness of from about 0.012 mm to about 0.051 mm.

Exemplary polyethylene films are manufactured by Clopay Corporation of Cincinnati, Ohio, under the designation P18-0401 and by Ethyl Corporation, Visqueen Division, of Terre Haute, Indiana, under the designation XP-39385. The backsheet is preferably embossed and/or matte finished to provide a more clothlike appearance. Further, the backsheet can permit vapors to escape from the absorbent structure (i.e., be breathable) while still preventing exudates from passing through the backsheet. In particular for pantliners or sanitary napkins having a low quantity of liquid to absorb according to their intended use it is possible to utilise apertured hydrophobic, polymeric films having directional liquid transport - such as those disclosed above for topsheets - towards the absorbent structure, as breathable backsheets.

#### Adaptability of the article

As indicated above it is desirable to provide articles which are adaptable to the various sizes of undergarments a user has in order to allow for individualized consistent application of a disposable absorbent article while the various pairs of undergarment would otherwise require different sizes of disposable absorbent articles to achieve this result. The intention of adaptability is hence not to address the problem which long since has caused manufacturers of disposable absorbent articles to offer more than one size of their respective product, even

so this may be achieved to a certain extent based on the adaptability provided for by the preferred embodiments according to the present invention.

Adaptability according to the present invention can be provided by creating a series of corrugations or pleats in the direction perpendicular to the direction in which the product is desired to be adaptable. For example a sanitary or pantiliner having corrugations or pleats in longitudinal direction will provide the ability to be stretched in transverse direction in order to accommodate a crotch width of an undergarment upon application of the sanitary napkin or pantiliner which is wider than the article width at the crotch as delivered to the user. These corrugations or pleats can also provide the ability to reduce the width of the article in order to result in the usual wearing position in the undergarment.

The ability to adapt to the desired extent upon application can be provided in longitudinal or transverse direction. It can be employed to provide synergistic effects together with elastically extensible materials in the construction of the absorbent article. It is of course also possible to use inherent material adaptability with the structural contractability provided by corrugations or pleats.

The term "corrugated or corrugations" as used herein designates the existence of a series of continuous changes of the normal direction of a plain of a sheet. The "normal direction" of a plain is the direction perpendicular to that plain. While corrugations are a continuous change of the normal direction in the plain of a sheet the term "pleats" or "pleated" as used herein refers to foldings along a specific line or, in other words, an abrupt change in the normal direction of a plain of a sheet. A series of pleats can also be used to simulate corrugations and from a theoretical point of view corrugations are approached by an infinite number of pleats.

In particular for pantliners a process termed ring-rolling can be employed upon the whole product to provide structural corrugations allowing for adaptability of the product as desired. Such ring-rolling at least in a high speed manufacturing operation does require the materials to be carefully selected by a man skilled in the art which however is no problem given the above material choices and a desired adaptability in mind. Ring-rolling of individual materials prior to

combination can also be useful in order to provide products in addition to their adaptability having a flexibility and softness improvement over usual products. Ring-rolling is described in more detail in US 4, 107, 364, US 4, 834, 741, US 5, 156, 793, US 5, 143, 679, US 5, 167, 897 and US 5, 354, 400 which gives a detailed explanation how to provide differential extensibility as well.

Also corrugating is well-known and will be easily usable for those skilled in the art. Corrugations may be present in both longitudinal and transverse direction of the absorbent article, however, corrugation techniques have been developed to provide corrugations which are transverse to the direction of material transport during manufacturing of an article. Hence a ring-rolling operation can be considered to provide corrugation in the direction of transport of a material during manufacturing while a corrugation process would typically provide only corrugation in the perpendicular direction.

However, the term corrugations or pleats as used herein does refer to the result of ring-rolling or corrugating irrespective of whether the process was used in the direction of transport of a material during manufacturing or perpendicular thereto.

The required extend of corrugation or pleats (defined by amplitude and frequency) can easily be defined by simple trial and error to accommodate the required adaptability. It will depend on the combined thickness and flexibility of the article. Those skilled in the art will also realize that the same corrugation or pleats can be provided such that they allow different extends of adaptability depending on whether they have been partially flatered again or not. |

In order to provide the wearer with an article having a high degree of adaptability it is necessary to maintain the corrugations formed upon manufacturing during the remainder of the manufacturing process as well as the packaging operation, transport to the product supply locations and personal handling of the product prior to attaching it to the undergarment. This can be achieved for example by stabilising or freezing the product in its corrugated or pleated state by affixing it in that state to a rigid subtrade such as for example the panty fastening release paper or panty fastening adhesive protection means if pantry fastening is included at all.



### The panty-fastening-adhesive

The backsheet typically forms the garment facing surface on which the optional but preferred panty fastening means is placed. The panty fastening means can be an adhesive and would then provide the usual panty fastening adhesive.

Panty-fastening-adhesives can comprise any adhesive or glue used in the art for such purposes with pressure-sensitive adhesives being preferred. Suitable non-extensible adhesives are Century A-305-IV manufactured by the Century Adhesives Corporation, Instant Lock 34-2823 manufactured by the National Starch Company, 3 Sigma 3153 manufactured by 3 Sigma, and Fuller H-2238ZP manufactured by the H.B. Fuller Co. Suitable adhesive fasteners are also described in U.S. Patent 4,917,697. Other suitable panty-fastening-adhesives are shown in PCT International Patent Publication No. WO 92/04000; WO 93/01783 and WO 93/01785.

It should be understood that since it is desired to make the component that forms the garment facing surface of the sanitary napkin (and any overlying components) adaptable to the wearer's panties, the particular adhesive needs to support this ability. The panty fastening adhesives are preferably applied in intermittent patterns such as for example intermittent dots, intermittent strips, random or designed filamentary patterns to permit the sanitary napkin to adapt.

If the panty fastening means is provided by adhesive it is in the context of the present invention important that not the whole backsheet surface be provided with the adhesive. In particular if pleats are formed it is important that only the outwardly pointing area of the backsheet which ultimately comes into initial contact with the undergarment upon attaching the absorbent article to the undergarment is provided with the adhesive and not the portion of the pleats where one adhesive surface would face another adhesive surface risking that the product adheres to itself and is rendered unsuitable for use. In order to best accommodate this application of adhesive as panty fastening adhesive it is possible to apply the adhesive to the panty fastening adhesive protection means

such as the release paper and transfer it only to the backsheet where the release paper touches the panty fastening adhesive.

In addition to adhesives, other types of fasteners can be used instead of , or in addition to adhesives. These other types of fasteners are arranged in patterns similar to those of the adhesive. Such fasteners include, but are not limited to conventional VELCRO hook material or similar fasteners.

The optional protective side flaps can have optional fasteners thereon for additional security. The optional protective side flap fasteners can be any of the types of fastening materials herein above. The fasteners assist the protective side flaps in staying in position after they are wrapped around the edges of the crotch surface of the protective side flaps. The side flap fasteners can be provided in addition or instead of the panty fastening means described above.

Prior to use of the absorbent article the panty fastening adhesive is typically protected from contamination and from sticking to any surface where this is not desired, by a protective cover means such as a silicone coated release paper, a plastic film or any other easily removable cover. The protective cover means can be provided as a single piece or in a multitude of pieces e.g. to cover the individual adhesive areas.

In particular for embodiments according to the present invention having corrugations or pleats in the backsheet (or in the whole product) it is desirable to provide the panty fastening adhesive only on those portions of the corrugation or pleats directed outward from the article (i.e. those parts of the backsheet making first contact with the undergarment upon use of the article). On these embodiments the protective cover means is preferably a non-extensible and non-contractible material. It will then protect the adhesive and maintain the article in its corrugated or pleated condition ready to adapt until removal of the cover means. In this context the above mentioned release papers have been found most useful.

**WHAT IS CLAIMED IS:**

- 1.) An absorbent article for joining to the undergarment of a wearer, said article having a longitudinal axis and a transverse axis comprising
  - a topsheet having liquid passage ways;
  - a backsheet having an outer surface which is facing said undergarment during use;
  - an absorbent core interposed between said topsheet and said backsheet;
  - a panty fastening means, said panty fastening means being provided on said outer surface of said backsheet;said article being characterised in that
  - said article is adaptable in size at least in one idirection selected from parallel to said longitudinal axis or parallel to said transverse axis or combinations thereof.
- 2.) An absorbent article according to claim 1 wherein said article is adaptable only in a direction substantially parallel to said transverse axis.
- 3.) An absorbent article according to any of the preceding claims wherein said article is a panty liner or sanitary napkin and said article has a maximum thickness of less than 5 mm, preferably less than 2 mm.
- 4.) An absorbent article according to any of the preceding claims wherein said article further comprises a release liner protecting said panty fastening means prior to use of said article and wherein said topsheet, said backsheet and said absorbent core are corrugated or pleated with the corrugations or pleats being parallel to said longitudinal axis.
- 5.) An absorbent article according to claim 4 wherein said release liner is substantially non-extensible and non-contractible so as to maintain said corrugations or pleats during manufacturing, packaging and transport of said article until use of said article.
- 6.) An absorbent article according to any of the preceding claims wherein at least one of said topsheet, said backsheet or said absorbent core is elastically

extensible and the non-elastically extensible of said topsheet, said backsheet or said absorbent core is in a corrugated or pleated form with the corrugations or pleats being substantially parallel to said longitudinal axis.

7.) An absorbent article according to claim 6 wherein the whole of said article is elastically extensible beyond the extend of adaptability, preferably each of said topsheet, said core and said backsheet are individually and in their combination elastically extensible, and the whole of said article is corrugated or pleated with the corrugations or pleats being substantially parallel to said longitudinal axis.

8.) An absorbent article according to claim 7 wherein said article further comprises a release liner protecting said panty fastening means prior to use of said article wherein said release liner is substantially non-extensible and non-compressible so as to maintain said corrugations or pleats during manufacturing, packaging and transport of said article until use of said article.

9.) An absorbent article according to any of the preceding claims wherein the panty fastening means is a pressure sensitive adhesive.

10.) An absorbent article according to claim 9 wherein the whole of said article is corrugated or pleated with said pressure sensitive adhesive being applied to the outward facing covers of said corrugated or pleated outer surface of said backsheet.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US97/06479

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :A61F 13/15

US CL :604/385.2, 387

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 604/385.1, 385.2, 386, 387

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 4,940,462 A (SALERNO) 10 July 1990, figures.	1 ----- 1, 3
X --- Y	US 4,911,701 A (MAVINKURVE) 27 March 1990, figures.	1, 2 ----- 3
X --- Y	US 5,037,417 A (TERNSTROM et al) 06 August 1991, figures.	1, 2 ----- 3

☒ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

Special categories of cited documents:	
*A* document defining the general state of the art which is not considered to be of particular relevance	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*E* earlier document published on or after the international filing date	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
*L* document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
*O* document referring to an oral disclosure, use, exhibition or other means	
*P* document published prior to the international filing date but later than the priority date claimed	*A* document member of the same patent family

Date of the actual completion of the international search

29 MAY 1997

Date of mailing of the international search report

11 JUL 1997

 Name and mailing address of the ISA/US  
 Commissioner of Patents and Trademarks  
 Box PCT  
 Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

KARIN REICHLE

Telephone No. (703) 308-2617

**INTERNATIONAL SEARCH REPORT**International application No.  
PCT/US97/06479**Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)**

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☒ Claims Nos.: 4-10  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

- ☐ The additional search fees were accompanied by the applicant's protest.  
☐ No protest accompanied the payment of additional search fees.

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US97/06479

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 5,389,094 A (LAVASH et al) 14 February 1995, Figs. 2 and 14; and col. 6, lines 21-25; and col. 7, lines 40-45	1, 2 ----- 3
Y	US 4,950,264 A (OSBORN, III) 21 August 1990, col. 15, lines 15-59.	3